

REMARKS / ARGUMENTS

Initially, it is noted that this Amendment and Supplemental Information Disclosure Statement is in the newly required format for responses to office actions, such that each section of begins on a separate page.

Priority

Applicant and his attorney thank the Examiner for pointing out the error in the date of the prior pending provisional US patent application specified in the cross reference paragraph of the present specification that was previously introduced by Preliminary Amendment. Since applicant's attorney has been unable to locate a copy of the aforesaid as-filed Preliminary Amendment for this application, by the foregoing amendments, a new cross reference paragraph, which correctly notes the filing date of October 24, 2002 for US Serial No. 60/242,371, has been provided to replace the erroneous paragraph. Entry of the new replacement cross reference paragraph is respectfully requested.

Claim Amendments

By the foregoing amendments, Claims 7, 8, 21, 25, 28 and 29 have been cancelled. Independent Claims 1 and 19 and dependent Claims 5, 16 and 18 have been amended to clarify the features of the present invention. New Claim 35 has been added.

More particularly, amended Claims 1, 5, 16 and 18 now recite that the amount of a mixture of zinc chloride and a zinc carboxylate in the polymer composition of the present invention is from greater than 0.5 (rather than "about 0.005") to about 2 phr (Claim 1) and 1.0 phr (Claims 5, 16 and 18). Furthermore, as explained in further detail hereinafter, Claim 19 has been amended to eliminate certain chemical compounds.

Lastly, it is noted, for reasons which will become clear hereinafter, that new Claim 35 recites similar subject matter as Claim 19, except that it includes only the

compounds eliminated from amended Claim 19 and includes the recitation of a range for the amount of a mixture of zinc chloride and a zinc carboxylate in the stabilizer.

It is respectfully submitted that the foregoing amendments are supported by the present specification and do not introduce any new matter into the present application. In the foregoing circumstances, it is hereby respectfully requested that amended Claims 1, 5, 16, 18, 19 and new Claim 35 be entered into the present application for examination on the merits.

Claim Rejections Under 35 U.S.C. §§ 102(a), 102(e) and 103(a)

On page 2-3 of the Office Action, the Examiner has rejected all of pending Claims 1-34, under U.S.C. §§ 102(a) or (e), as being anticipated by Conroy et al. (US 6,232,380), Duvall et al. (US 6,528,566), Duvall et al. (US 2002/0086920), or Morton International (EP 0 890 608). On pages 3-4, the Examiner also rejected all of pending Claims 1-34, under U.S.C. § 103(a), as being obvious and, therefore, unpatentable based on the same four aforesaid references. Applicant respectfully traverses these rejections for the reasons which follow.

Since pending Claims 1-6 and 9-18 are directed to a polymer composition comprising, among other things, a stabilizer compound and pending Claims 19-35 are directed to the stabilizer compound alone, the aforesaid rejections of the claims as applied to Claims 1-6 and 9-18, and as applied to Claims 19-35, will be discussed separately hereinbelow.

Patentability of Pending Claims 1-6 and 9-18

As recited in pending Claims 1-6 and 9-18, the present invention relates generally to a polymer composition normally susceptible to heat-induced decomposition. More particularly, as recited in amended independent Claim 1, the polymer composition of the present invention comprises:

- a halogen-containing polymer,
- the degradation products of a blocked mercaptan,
- from greater than 0.5 to about 2 phr of a mixture of zinc chloride and a zinc carboxylate, and

- from 0 to about 10 phr of at least one co-stabilizer.

In addition, as recited in amended Claim 1, the degradation products of the blocked mercaptan are present during processing of the composition at an elevated temperature and include a free mercaptan and the blocked mercaptan has a structure which is recited in detail in amended Claim 1. The co-stabilizer component is selected from the group consisting of an epoxy compound and an organic phosphate.

It is respectfully submitted that none of the references cited by the Examiner in the Office Action provide disclosures which either anticipate or make obvious the present invention as recited in amended independent Claim 1. For example, Duvall et al. '566 and Morton International '608 both lack the feature of the present invention relating to the amount of zinc compounds present in the polymer composition. Furthermore, they both lack any suggestion or indication that a different amount, such as the amount recited in amended Claim 1 of the present application, would provide even greater benefits than the amounts disclosed therein, which, in fact, turns out to be true, as discussed in further detail hereinafter. Moreover, the vinyl chloride resin disclosed by Duvall et al. '920 and the stabilizer and clear PVC compositions disclosed by Conroy et al. both entirely lack the mixture of zinc chloride and zinc carboxylate that is a required feature of the polymer composition of the present invention.

In particular, Duvall et al. '566 and Morton International '608 both disclose polymer compositions comprising:

- a halogen-containing polymer,
- the degradation products of a blocked (i.e., latent) mercaptan, where the blocked (i.e., latent) mercaptan has the structure provided in detail each of the disclosures (i.e., Duvall et al. '566 and Morton International '608), and
- by weight of a metal-based stabilizer or Lewis acid, or a combination thereof (see, for example, Duvall et al. '566, Col. 9, line 66 to Col. 10, line 36, and Claim 1; and Morton International '608, page 9, lines 29-47, and Claim 1).

In both Duvall et al. '566 and Morton International '608, the metal-based stabilizers are disclosed as including various metal salt stabilizers, such as zinc carboxylate and other metal-containing compounds, and the Lewis acids are disclosed as including zinc chloride, as well as boron trifluoride, aluminum chloride, and methyltin trichloride. In particular, both Duvall et al. '566 and Morton International '608 teach that the metal-based stabilizer is present in an amount of from about 0.01% to less than 0.5% by weight based on the halogen-containing polymer in the polymer composition. The Lewis acid, according to Duvall et al. '566 and Morton International '608, is present in an amount of from about 0.005% to less than 0.5% by weight based on the halogen-containing polymer in the polymer composition.

In contrast, the polymer composition of the present invention, as recited in amended independent Claim 1, comprises a mixture of zinc chloride and a zinc carboxylate in an amount of from greater than 0.5 to about 2 phr. In this regard, it is noted that where the metal in the metal-based stabilizer and in the Lewis acid is zinc, amount measured in phr and in weight percent based on the weight of the halogen-containing polymer are synonymous and, therefore, directly comparable. Thus, the amount of zinc compounds (i.e., mixture of zinc chloride and zinc carboxylate) in the polymer composition of the present invention, as recited by amended independent Claim 1 falls outside the range taught by either Duvall et al. '566 or Morton International '608. In the foregoing circumstances, it is respectfully submitted that neither Duvall et al. '566 or Morton International '608 anticipate the present invention as recited in amended independent Claim 1.

In addition, neither Duvall et al. '566 or Morton International '608 contain any suggestion or indication, either explicit or based upon the knowledge of persons of ordinary skill in the art, that a different (i.e., greater) amount of zinc compounds, such as the amount recited in amended Claim 1 of the present application, would provide even greater benefits than the amounts (i.e., lesser) disclosed in Duvall et al. '566 or Morton International '608. In fact, as determined by Applicant and demonstrated by the results displayed on Exhibit A attached hereto, the early color of the polymer composition is significantly improved by the inclusion of a greater amount of zinc compounds (i.e., from

greater than 0.5 to about 2 phr of a mixture of zinc chloride and a zinc carboxylate) than is disclosed in either Duvall et al. '566 or Morton International '608 (i.e., both less than 0.5%). See also, pages 1-2 of the published version of the present specification, US 2002/0091179, paragraph [0011], for a discussion of the importance of early color and the synergy of the mixture of zinc chloride and a zinc carboxylate.

With reference to Exhibit A (forward esters) and Exhibit B (reverse esters), polymer composition chips are shown which include poly(vinyl) chloride ("PVC") as the halogen-containing polymer, either forward or reverse esters as the blocked mercaptan, and varying amounts of a mixture of zinc chloride and a zinc carboxylate at fixed percentages (i.e., 20% zinc chloride and 80% zinc laurate). Exhibits A and B show the early color achieved, as well as the color deterioration over time. More particularly, the first row of chips of each of Exhibits A and B comprises PVC and 0.5 phr (%) of a mixture of zinc chloride and a zinc carboxylate (i.e., zinc laurate). The chips of rows 2, 3, 4 and 5, of each of Exhibits A and B, comprise PVC and 0.75 phr (5), 1.0 phr (%), 1.5 phr (%) and 2.0 phr (%), respectively, of a mixture of zinc chloride and a zinc carboxylate (i.e., zinc laurate). A comparison of the chips in columns 2, 4 and 6 of Exhibit A (which also correlates to the passage of time, in minutes) clearly show that better, lighter early color of the polymer composition is achieved as the amount of the mixture of zinc chloride and a zinc carboxylate included is increased above the 0.5% disclosed by Duvall et al. '566 or Morton International '608. Similarly, a comparison of the chips in columns 2, 4, 6, 8 and 10 of Exhibit B (which also correlates to the passage of time, in minutes) clearly show that better, lighter early color of the polymer composition is achieved as the amount of the mixture of zinc chloride and a zinc carboxylate included is increased above the 0.5% disclosed by Duvall et al. '566 or Morton International '608. Persons having ordinary skill in the art recognize that the polymer composition of the first row of chips in each of Exhibits A and B, containing only 0.5 phr (%) of zinc compounds, has an early color that is too dark and, therefore, is not suitable for use in producing white PVC finished goods, but that the polymer compositions of the present invention, containing greater than 0.5 phr (%) and shown in rows 2-5, especially rows 4 and 5 in each of Exhibits A and B, are suitable for such use.

In the foregoing circumstances, the polymer composition of the present invention, as recited in amended independent Claim 1 and which includes from greater than 0.5 to about 2 phr of a mixture of zinc chloride and a zinc carboxylate, is not made obvious by the disclosures of either Duvall et al. '566 or Morton International '608. This is because there is no indication in either reference that the higher zinc compound content of the polymer composition of the present invention would provide benefits or improvements over the amounts disclosed in either of these references, and, as demonstrated by the results presented in Exhibit A, such benefits and improvements are so achieved. It is respectfully submitted that, based on the foregoing comments and Exhibit A, amended independent Claim 1, as well as dependent Claims 2-6 and 9-18 which depend either directly or indirectly from Claim 1, are allowable over both Duvall et al. '566 and Morton International '608.

With reference now to Duvall et al. '920 and Conroy et al., it is noted that neither of these documents disclose polymer compositions that include from greater than 0.5 phr to about 2.0 phr of a mixture of zinc chloride and zinc carboxylate, as in the present invention. Duvall et al. '920 discloses a PVC resin composition comprising a blocked mercaptan, having a structure recited in detail therein, and a zinc ionomer which is defined as being a zinc salt of oxidized polyethylene. The purpose of including the zinc ionomer in the PVC resin composition, as explained at page 1, paragraph [0006] of Duvall et al. '920, is to improve the hydrophilicity (or wettability) of the surfaces of articles made from the PVC resin composition. More particularly, the zinc ionomer is made by reacting a selected zinc compound with oxidized polyethylene (see Duvall et al. at page 5, paragraphs [0050] and [0052]).

In the present invention as recited in amended independent Claim 1, on the other hand, a mixture of two particular zinc compounds, i.e., zinc chloride and a zinc carboxylate, is used in the polymer composition as a heat stabilizer to improve the early color of the polymer composition. The zinc chloride and zinc carboxylate utilized in the polymer composition of the present invention are not reacted with one another, or any other compound, but rather, they are only physically mixed with one another and the latent (blocked) mercaptan (see page 3 of the published version of the present

specification, US 2002/0091179, paragraph [0023], which discusses “blending” the components by “shaking” or “stirring” to produce a homogenous mixture). Thus, the zinc ionomer of Duvall et al. ‘920 is not the same as, nor does it suggest or recommend, the mixture of zinc chloride and zinc carboxylate of the present invention as recited in amended independent Claim 1. Thus, it is respectfully submitted that the present invention, as recited in amended independent Claim 1, is not anticipated or made obvious in view of Duvall et al. ‘920. It is further submitted that, based on the foregoing comments, amended independent Claim 1, as well as dependent Claims 2-6 and 9-18 which depend either directly or indirectly from Claim 1, are allowable over Duvall et al. ‘920.

Lastly, it is noted that Conroy et al. does not include all of the features of the present invention as recited in amended independent Claim 1 and, in fact, teaches away from application of its disclosure to the opaque (e.g., white) polymer compositions of the present invention. In particular, Conroy et al. ‘380 discloses stabilizer compositions are added to clear halogen-containing polymer compositions and comprise a latent (blocked) mercaptan, having the structure set forth in detail in Conroy et al., and a synergistic amount of a free phenyl salicylate (see Conroy et al., Col. 4, lines 19-26). Conroy et al., does not teach or disclose that the stabilizer necessarily includes any other stabilizers, let alone specifically a mixture of zinc chloride and zinc carboxylate, as in the present invention.

The stabilizer compositions of Conroy et al. are useful for protecting clear halogen-containing polymer compositions against discoloration and degradation due to exposure to ultraviolet light, weathering and heat, whereas this benefit is not realized when such stabilizers are added to opaquely pigmented or filled halogen-containing polymer compositions (see Conroy et al., Col. 4, lines 27-30). Moreover, Conroy et al., at Col. 20, lines 28-30, explicitly states that “[t]he halogen-containing polymer compositions that are stabilized by the stabilizer compositions of this invention are generally limited to clear formulations” (emphasis added). Thus, the primary disclosure and teaching of Conroy et al. is the stabilization of clear halogen-containing polymer compositions rather than the stabilizing opaque polymer compositions and it is clearly

stated that the invention of Conroy et al. is applicable to clear polymer compositions and will not function as asserted when applied to opaque polymer compositions. Therefore, Conroy et al. teaches away from the application of its disclosure to opaque polymer compositions, such as the present invention, and, therefore, persons having ordinary skill in the art would not have applied the teachings of Conroy et al. to the problem of heat stabilizing opaque polymer compositions to achieve better early color.

Moreover, Conroy et al. teaches the use of a combination latent mercaptan-free phenyl salicylate stabilizer which does not necessarily include a mixture of zinc chloride and zinc carboxylate. Although additional possible stabilizers are disclosed by Conroy et al., they are listed merely to include the possibility that the combination latent mercaptan-free phenyl salicylate stabilizer may not be the only stabilizer used in the clear halogen-containing polymer. More particularly, Conroy et al. further discloses that, in addition to the latent mercaptan-and-free phenyl salicylate stabilizer, the clear halogen-containing polymer composition may also, but does not have to, include a metal-based stabilizer, a Lewis acid, an organic-based stabilizer, or a hydrotalcite-based stabilizer in admixture with the latent mercaptan (see Conroy et al., Abstract, and Col. 17, line 66 to Col. 18, line 3), or even conventional non-metallic stabilizers (see Conroy et al., Col.20, lines 6-9). In this regard, it is noted that Conroy et al. group together many various types of possible additional stabilizer compounds and provide lists of exemplary compounds, without any statement or indication concerning which, if any, of them may function better than others or how to select which ones might be useful, let alone that a mixture of zinc chloride and a zinc carboxylate would be preferable. Conroy et al. does not suggest or recommend that the free phenyl salicylate is interchangeable with any of the other possible additional stabilizers, such that it could be substituted by one or more of the possible additional stabilizers, since this would destroy the functionality of the combination latent mercaptan-free phenyl salicylate stabilizer. Thus, there is nothing in Conroy et al., that would recommend the present invention, as recited in amended independent Claims 1, to a person of ordinary skill in the art.

In the foregoing circumstances, it is respectfully submitted that the disclosure of Conroy et al. does not anticipate or make obvious the present invention as recited in amended independent Claim 1. Thus, it is submitted that amended Claim 1, as well as dependent Claims 2-6 and 9-18 which depend either directly or indirectly from Claim 1, are allowable over Conroy et al.

Patentability of Claims 19-35

As recited in Claims 19-35, the present invention relates generally to a stabilizer composition. More particularly, the stabilizer composition of the present invention, as recited in amended independent Claim 19, comprises:

- a latent (i.e., blocked) mercaptan of the structure recited in detail in Claim 19 and having certain possible R¹ constituents, as follows:
 - alkyl, alkylenyl, cycloalkyl, cycloalkylenyl, aryl, alkaryl, aralkyl, aralkylenyl, dihydroxyalkyl, alkoxyalkyl, hydroxyalkoxyalkyl, alkoxy(hydroxyalkyl), alkoxy(acyloxyalkyl), alkoxy(polyalkoxy)alkyl, alkoxy(polyalkoxy)carbonylalkyl, carboxyalkyl, alkoxycarbonylalkyl, alkoxycarbonylalkylenyl, hydroxyalkoxycarbonylalkyl, hydroxy(polyalkoxy)carbonylalkyl, mercaptoalkyl, mercaptoalkylenyl, mercaptoalkoxycarbonylalkyl, mercaptoalkoxycarbonylalkylenyl, alkoxycarbonyl(amido)alkyl, alkylcarbonyloxy(polyalkoxy)carbonylalkyl, tetrahydropyranyloxy(polyalkoxy)carbonylalkyl, tetrahydropyranyloxyalkyl, hydroxyaryl, mercaptoaryl or carboxyaryl radical having from 1 to 22 carbon atoms,
- a mixture of zinc chloride and a zinc carboxylate, and
- optionally, at least one co-stabilizer selected from the group consisting of an epoxy compound and an organic phosphite.

It is noted that the foregoing amendments to Claim 19 have eliminated the compounds listed in Duvall et al. '566 (see Column 5, lines 34-43) and Morton International '608 (see page 4, lines 45-48) as being possible constituents of the R¹

group of the latent mercaptan. Thus, there is now no overlap between the possible constituents for the R¹ group disclosed in Duvall et al. '566 or Morton International '608. and those that are possible constituents of the R¹ group of the mercaptan that is part of the stabilizer of the present invention as recited in amended Claim 19. Moreover, it is noted that many of the compounds that remain listed in amended Claims 19 result in the mercaptan being "forward esters" (i.e., they contain an "alkoxy-carbonyl" arrangement in the R¹ group constituent), none of which are listed or even suggested by the disclosures of Duvall et al. '566 or Morton International '608. It is further noted that, as discussed hereinabove, Exhibit A shows the advantages achieved relating to early color hold of halogenated polymer resins containing the stabilizer compounds of the present invention as recited in amended Claim 19 (i.e., stabilizer compound including forward ester-type mercaptans and a mixture of zinc chloride and a zinc carboxylate (zinc laureate)). A comparison of Column 2 of Exhibit A (forward esters) with Column 2 of Exhibit B (reverse esters) even show a noticeable improvement in the early color (closer to white) that is achieved using forward ester-type mercaptans (Ex. A) rather than reverse ester-type mercaptans (Ex. B) at similar zinc mixture levels. Thus, it is believed that neither Duvall et al. '566 or Morton International '608 anticipate or make obvious the stabilizer composition of the present invention as recited in amended independent Claim 19. Moreover, since Claims 2-6 and 9-18 depend directly or indirectly from Claim 19, it is submitted that Claims 2-6 and 9-18 are also novel and unobvious over Duvall et al. '566 and Morton International '608.

With reference now to new Claim 35, the stabilizer composition of the present invention as recited therein, comprises:

- a latent (i.e., blocked) mercaptan of the structure recited in detail in Claim 19 and having certain possible R¹ constituents, as follows:
 - a hydroxyalkyl, hydroxy(polyalkoxy)alkyl, acyloxyalkyl, acyloxy(hydroxyalkyl), acyloxyalkoxyalkyl, acyloxy(polyalkoxy)alkyl, benzoyloxy(polyalkoxy)alkyl, or alkylenebis-(acyloxyalkyl),
- from greater than about 12.5 wt% to 75 wt% of a mixture of zinc chloride and a zinc carboxylate, based on the total weight of the stabilizer, and

- optionally, at least one co-stabilizer selected from the group consisting of an epoxy compound and an organic phosphite.

It is noted that new Claim 35 recites only those compounds that were eliminated from original Claim 19, by the foregoing amendments, as being possible constituents of the R¹ group of the mercaptan that is part of the stabilizer of the present invention. It is further noted that while the possible R¹ group constituents recited in new Claim 35 are listed in either or both of Duvall et al. '566 (see Column 5, lines 34-43) and Morton International '608 (see page 4, lines 45-48), they (and, therefore, also the zinc compounds) are present in a different amount than the range which is disclosed in Duvall et al. '566 and Morton International '608. More particularly, Duvall et al. '566 and Morton International '608 both disclose that the amount of blocked mercaptan present in the stabilizer compositions thereof is between about 87.5 wt% and about 98.5 wt%, with the balance (i.e., from 1.5 wt% to 12.5 wt%) comprising the metal-based stabilizer or Lewis acid (see Duvall et al. '566 at Column 4, lines 54-61; and Morton International '608 at page 3, lines 46-48). On the other hand, the stabilizer composition of the present invention, as recited in new Claim 35, comprises from greater than 12.5 to 75 wt% of a mixture of zinc chloride and a zinc carboxylate. The advantages of using higher amounts of the mixture of zinc chloride and a zinc carboxylate in the stabilizer than the amounts disclosed in the cited prior art are shown in Exhibits A and B and have been previously discussed hereinabove. Thus, it is submitted that neither Duvall et al. '566 or Morton International '608 anticipate or make obvious the stabilizer composition of the present invention as recited in new Claim 35.

With reference to the remaining two references cited by the Examiner (i.e., Duvall et al. '920 and Conroy et al.), neither of them disclose the inclusion of a mixture of zinc chloride and a zinc carboxylate in a stabilizer for halogenated polymer resins, as in the present invention as recited in both of independent Claims 19 and 35. As discussed hereinabove, Duvall et al. '920 discloses the inclusion of a zinc ionomer which is prepared by reacting a zinc compound with oxidized polyethylene and functions to improve the hydrophilicity (wettability) of the surfaces of articles made from PVC resin to

which the zinc ionomer is added. The zinc ionomer of Duvall et al. '920 does not include a mixture of zinc chloride and a zinc carboxylate as does the stabilizer composition of the present invention as recited in new Claim 35. Moreover, the zinc ionomer of Duvall et al. '920 does not improve the early color hold, nor the heat-induced deterioration, of the halogenated resin to which it is added, as does the present invention. As also discussed hereinabove, it is respectfully submitted that Conroy et al. teaches away from the application of its disclosure to opaque (e.g., white) polymer compositions, which is clearly the intended use of the stabilizer composition of the present invention, as disclosed and explained in the present specification. To the contrary, Conroy et al. discloses stabilizer compositions for addition to clear halogenated polymer compositions and which are required to include a synergistic amount of a free phenyl salicylate, which is not at all part of the stabilizer composition of the present invention as recited in new Claim 35. Thus, it is submitted that neither Duvall et al. '920 or Conroy et al. anticipate or make obvious the stabilizer composition of the present invention as recited in new Claim 35.

In view of the foregoing amendments and remarks, re-examination and allowance of Claims 1-6 and 9-34, as well as examination and allowance of new Claim 35, are respectfully requested. All of Claims 1-6 and 9-35 are believed to be allowable.

If there remain any outstanding issues which the Examiner believes could be resolved by telephone, the Examiner is cordially invited to telephone the undersigned attorney to discuss same at the telephone number provided below.

CONCLUSION

A fee of **\$950** is believed to be due in connection with the submission of this Amendment, since it is being submitted within three months after the originally set due date for response to the Office Action. This \$950 fee is addressed by the accompanying Petition for Extension, which authorizes this \$950 to be charged to **Deposit Account No. 18-1850**.

No additional fees are believed to be due in connection with the submission of this Amendment. If, however, any such fees, including petition and extension fees, are due, the Commissioner is hereby authorized to charge such fees to **Deposit Account No. 18-1850**. In the meantime, please direct all future correspondence relating to the present application to the undersigned attorney.

Date: **November 20, 2003**

Rohm and Haas Company
100 Independence Mall West
Philadelphia, Pa. 19106-2399

Attachments (Exhibit A and Exhibit B)

Respectfully Submitted,



Marcella M. Bodner
Attorney for Applicants
Reg. No. 46,561
Telephone (215) 592-3025